

**REVIEW OF PREVENTIVE AND DEFERRED
MAINTENANCE POLICIES AND PRACTICES**

DECEMBER 2001



EXECUTIVE SUMMARY

We have reviewed the status of maintenance performed by state agencies and higher education institutions over the Commonwealth's buildings and determined the extent of maintenance being performed, the effectiveness of the maintenance, and the impact it has on the buildings. In addition, we have reviewed whether the major state agencies and higher education institutions have a reliable mechanism in place for determining their maintenance backlog.

We have determined that many agencies and institutions do not have preventive maintenance schedules. Some agencies and institutions have schedules, but the schedules are incomplete. We found that most agencies and institutions could not reasonably or accurately determine the extent of their deferred maintenance backlog and that most had no methodology in place to allow them to do so. We believe that the Facility Condition Reporting Guidelines set out by the State Council on Higher Education for Virginia (SCHEV) for the higher education institutions is effective and would be beneficial if applied to all state agencies and institutions.

Our recommendations include:

- The General Assembly may wish to require each agency and higher education institution that has at least one building to perform a comprehensive review and determine the dollar amount of its deferred maintenance backlog.
- The General Assembly may wish to adopt a routine, quantifiable method for assessing the condition of the facilities in the Commonwealth. The General Assembly should consider adapting the SCHEV facility condition assessment process for all state agencies and institutions.
- The General Assembly and the Department of Planning and Budget should consider instituting a full life cycle analysis for each new capital project. The life cycle cost analysis includes annual operations and maintenance needs, projected maintenance reserve requirements by fiscal year, and a projected effective life for the asset. When the General Assembly commits to a new capital project under the full life cycle analysis process, it will commit to providing the maintenance funding for the life of the facility.
- The Department of Planning and Budget should require agencies and institutions to include preventive maintenance budgets in their operating budget proposals each year/biennium for each facility they own. The General Assembly should request and track deferred maintenance amounts as part of the budget process.
- The General Assembly may wish to create the capacity within the Department of General Services for the Department to develop routine building preventive maintenance schedules for distribution to agencies.

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RECOMMENDATIONS

December 4, 2001

The Honorable James S. Gilmore, III
Governor of Virginia
State Capital
Richmond, Virginia

The Honorable Vincent F. Callahan, Jr.
Chairman, Joint Legislative Audit
and Review Commission
General Assembly Building
Richmond, Virginia

We have reviewed the status of maintenance performed by state agencies and higher education institutions over the Commonwealth's buildings and determined the extent of maintenance being performed, the effectiveness of the maintenance, and the impact it has on the buildings. In addition, we have reviewed whether the major state agencies and higher education institutions have a reliable mechanism in place for determining their maintenance backlog.

Objectives

We had three objectives for our review of maintenance of state-owned buildings. These objectives were to determine if:

1. State agencies and higher education institutions have schedules for performing and tracking routine preventive maintenance;
2. State agencies and higher education institutions are able to reasonably and reliably assess the condition of state-owned buildings; and
3. State agencies and higher education institutions are maintaining schedules for deferred maintenance (necessary maintenance that has been deferred due to a lack of funding).

Scope

To perform our review, we conducted a brief, informal survey of selected state agencies and higher education institutions that own a majority of the Commonwealth's buildings. We developed standard definitions for preventive maintenance, preventive maintenance schedule, and deferred maintenance to ensure consistency when reporting information. We reviewed the study "Evaluation of Procedures Used to Assess Maintenance Reserve Needs" performed by Applied Management Engineering, Inc. as set out in the 1999 Acts of Assembly, Chapter 1072, §2-1 Item 1.01. We reviewed the State Council on Higher Education for Virginia's (SCHEV) Facility Condition Reporting Guidelines.

Results

We have determined that many agencies and institutions do not have preventive maintenance schedules. Some agencies and institutions have schedules, but the schedules are incomplete. We found that most agencies and institutions could not reasonably or accurately determine the extent of their deferred maintenance backlog and that most had no methodology in place to allow them to do so. While in most cases agencies and institutions could not identify a specific dollar amount, in all agencies and institutions surveyed, the funding need was considerably higher than the funding available. We believe that the Facility Condition Reporting Guidelines set out by SCHEV for the higher education institutions are effective and would be beneficial if applied to all state agencies and institutions.

We have recommended several steps that the Commonwealth could take to begin addressing this problem. We provide these recommendations within this report.

We discussed this report with the Department of General Services and the State Council of Higher Education for Virginia, and considered their comments on the report.

AUDITOR OF PUBLIC ACCOUNTS

DBC:whb
whb:31

BACKGROUND

The Commonwealth of Virginia owned buildings valued at over \$6.2 billion as of June 30, 2000. The useful life for a building ranges from 20 to 50 years depending on the building's characteristics. The useful life estimates assume that a certain amount of routine preventive maintenance will occur. Without this routine preventive maintenance, the buildings will fall into a state of disrepair before the useful life runs out and will result in an increase in repair and replacement costs.

The Commonwealth's budget process classifies maintenance expenditures into two categories. Routine maintenance expenditures are included in an agency's operating budget. There is a separate capital budget for maintenance reserve projects as a supplement to the operating budget. Maintenance reserve projects include items such as repairs to or the replacement of roofs; heating, ventilation, and air conditioning systems; electrical systems; steam lines; sanitary sewer systems; elevators; and parking lots. Maintenance reserve projects typically cost between \$25,000 and \$500,000.

Definitions

Preventive maintenance is the systematic, day-to-day maintenance or upkeep to control deterioration of the plant facilities including repetitive work (site maintenance, housekeeping, grounds keeping) and scheduled periodic work (preventive maintenance planned to provide adjustments, cleaning, minor repair, and routine inspections.)

Preventive maintenance schedule is a schedule that sets out the routine work items that require periodic and systematic performance such as roof inspections and painting. The schedule represents known items that require performance to keep the asset in serviceable condition.

Deferred maintenance represents all items or repairs that the agency identified as necessary but the agency has not performed. It is a cumulative total of past and present needs and does not include a projection of future needs. It does not necessarily equal the maintenance reserve request, as this amount may consider what funding the agency or institution believes it can realistically expect to receive and not necessarily the entire funding needs.

The Maintenance Process

The maintenance process begins the day the agency or institution acquires or constructs the building. The agency or institution should establish a preventive maintenance schedule setting out the maintenance activities relating to the building, including its systems and outer envelope, and timing of those activities. Agencies or institutions should include the costs to perform the routine maintenance in their operating budget each biennium.

In addition, the agency or institution should establish an inspection schedule for non-routine repairs and replacements. These periodic assessments should identify potential and current repairs. The agency or institution should address these repairs when found. For those that would require substantial funding, the agency or institution should include them as part of the agency or institution's capital outlay request.

Methodology

To perform our review, we conducted a brief, informal survey of selected state agencies and higher education institutions that own a majority of the Commonwealth's buildings as follows:

Agency	Percentage of Total Capitalized Buildings as of 6/30/00
Department of Corrections (DOC)	33%
Mental Health (DMHMR)	10%
Department of Transportation (VDOT)	10%
Department of General Services (DGS)	8%
Department of Juvenile Justice (DJJ)	4%
Higher Education Institutions	Percentage of Total Higher Education Property Plant and Equipment as of 6/30/00
University of Virginia (UVA)	29%
Virginia Tech (VPISU)	14%
Virginia Commonwealth University (VCU)	9%

We developed standard definitions (outlined in the previous section) for preventive maintenance, preventive maintenance schedule, and deferred maintenance to ensure consistency when reporting information. We reviewed the study "Evaluation of Procedures Used to Assess Maintenance Reserve Needs" performed by Applied Management Engineering, Inc. as set out in the 1999 Acts of Assembly, Chapter 1072, §2-1 Item 1.01. We reviewed the State Council on Higher Education for Virginia's (SCHEV) Facility Condition Reporting Guidelines.

SURVEY RESULTS

	DOC	DMHMR	DGS	VDOT	DJJ	UVA	VPISU	VCU
Does the agency have a preventive maintenance schedule for buildings?	Yes, as of 6/2001	Yes	Yes ¹	Yes, same as DGS ³	No	Yes	Yes	Yes
If they have a schedule, do they track the status of items?	Yes, as of 6/2001	Yes	Yes	Yes	N/A	Yes	Yes	Yes
Does the agency have a deferred maintenance backlog?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Amount of Deferred Maintenance	Unknown	Unknown	Unknown ²	Unknown	Unknown	\$105 million ⁴	\$123 million ⁴	\$65 million ⁴

- ¹ DGS has a preventive maintenance program that covers building hardware, roofs, and mechanical, electrical, plumbing, life safety, and waterproofing systems.
- ² The estimated cost to renovate and repair the capitol area buildings exceeds \$85 million. Other costs are undetermined at this time.
- ³ DGS performs all necessary maintenance for VDOT buildings based on DGS prepared schedules similar to their own facilities.
- ⁴ SCHEV requires all higher education facilities to conduct a facilities condition assessment at least every two years that includes an estimate of deferred maintenance expense.

Based on the survey results above, we determined that our definition of a preventive maintenance schedule differs substantially from what some of the agencies consider to be a preventive maintenance schedule. Many of the agencies and institutions have schedules that track the work they performed, not the work that they should perform; the schedules are not predictive and planning in nature. Often maintenance work is work order driven, based on a complaint or just an observation that an item needs to be repaired instead of a schedule. However, they often do not discover the need for most maintenance work until it has gotten to the point where it is repair work versus maintenance. For those agencies that do have preventive maintenance schedules, they are not all encompassing. They often focus only on major systems or components of the building. They do not take into account all aspects of the building including the structure, or envelope, or smaller items such as painting and carpeting. Agencies and institutions should routinely plan and budget for these expenditures as part of the cost of the asset.

MAINTENANCE RESERVE STUDY REVIEW

During the 1999 General Assembly session, the Governor and General Assembly authorized SCHEV and DGS in Chapter 1072 §2-1 Item 1.01 to hire a consultant to examine the methodologies used to determine maintenance reserve needs of the Commonwealth's agencies and institutions. This study was in response to a request by SCHEV who was concerned about the significant increase in building deficiencies at higher education facilities and the potentially significant funding implications this could have on the Commonwealth. DGS and SCHEV hired Applied Management Engineering, Inc., who performed the study and issued a report entitled "Evaluation of Procedures Used to Assess Maintenance Reserve Needs" in November 2000.

We reviewed the AME Study and agreed overall with their findings summarized below:

- There is no standard approach to inventory and valuation of facilities.
- There is no formalized or unified method or process for facility condition assessment.
- There is no standard quantifiable method (i.e. unit cost) to determine the cost estimate for facility deficiencies, and cost estimates are often determined based on the undocumented knowledge of an individual.
- None of the institutions or agencies employ a formalized prioritization process for maintenance reserve needs that incorporates facility deficiencies and prioritizes the needs based on cost avoidance, return on investment, impact on operational effectiveness, or other relevant criteria. The only exception to this is DPB policy that mandates roofing jobs as first priority.

- There is no standard time frame for assessing maintenance needs and projections or procedures for rolling over unfunded maintenance reserve jobs into the next funding cycle, including adjusting for inflation or other factors.
- There is a significant difference in how agencies and institutions report maintenance reserve needs. Some request funding only for the items they believe will receive funding. While others request funding for all maintenance needs. This results in inconsistent and incomparable information between years and between agencies and institutions and prohibits the determination of a comprehensive estimate of deferred maintenance in the Commonwealth.

The study made recommendations on how the Commonwealth should implement a uniform method for assessment of maintenance reserve needs which we considered when making our recommendations in this report.

SCHEV FACILITY CONDITION REPORTING GUIDELINES REVIEW

SCHEV is currently working on erasing the backlog of deferred maintenance for higher education institutions. In 1992, SCHEV established the Facility Condition Reporting Guidelines to help prioritize the use of maintenance reserve funding among the higher education institutions. The purpose of the program is to determine the overall condition of an institution's facilities and infrastructure and to estimate the maintenance and operating deficiencies. This requires each institution to inspect and analyze their facilities and determine the outstanding maintenance work. SCHEV uses this information to estimate the institutions' maintenance reserve needs. This program does not focus on current routine or preventive maintenance work.

Under the Facility Condition Reporting Guidelines, the institutions provide the current asset construction value and the cost of the deficiencies for each facility based on their inspections and valuations. For each facility, the institutions must report a current asset construction value developed based on specifications rather than just reporting the insured or replacement value. The institutions calculate the current asset construction value using national data on the construction cost per gross square foot provided by SCHEV considering any institution specific adjustments. The institution must also report the cost of deficiencies for each facility. These deficiencies are the cost of existing maintenance and repair deficiencies. Deficiencies can include: (1) repair or replacement of functionally obsolete, damaged, or inoperable built-in equipment, (2) repair or replacement of components of plant, (3) repair or replacement of existing utility systems, and (4) correction of problems resulting from erosion and drainage. Deficiencies do not include: (1) maintenance contracts, (2) routine periodic maintenance, (3) repair or replacement of specific-use, moveable equipment that is not permanently installed as part of the plant or property, and (4) leak testing and monitoring of underground storage tanks. The deficiencies also do not include life-cycle projections or planned renewal of components. These two factors determine the facility condition index.

$$\text{Facility condition index (FCI)} = \frac{\text{Cost of Deficiencies}}{\text{Current Asset Construction Value}}$$

SCHEV staff summarize the facility condition indexes reported by each institution to get an overall facilities condition rating for the institution. SCHEV evaluates the FCI on a three-tier scale:

FCI	Campus Condition Rating
Under 5%	Good
5 – 10%	Fair
Over 10%	Poor

According to SCHEV's 2000 report, only one institution rated "Good," three institutions rated "Fair," and the rest of the institutions rated "Poor." Within each Campus Condition Rating, each individual building has a facility condition index. Due to the age of the buildings and the lack of preventive maintenance, there are several facilities with an index greater than 100 percent, which means that it would cost more to repair the building than to completely rebuild it.

The Facility Condition Reporting Guidelines establish common reporting requirements in an effort to obtain comparable information about deficiencies in facilities and infrastructure across the Commonwealth's higher education institutions. This comparability allows SCHEV to recommend an allocation of funds that will provide the greatest benefit to the institutions with the most significant deferred maintenance needs. Despite SCHEV's efforts in this area, the Commonwealth still needs to establish specific qualifications or requirements over who should develop the building and deficiency estimates. There are also no guidelines on how to perform the inspections of the facilities and what to look for when deciding what deficiencies to report. Further, SCHEV's Facility Condition Reporting Guidelines do not address preventive and routine maintenance and do not decide how to address the deficiencies identified.

RECOMMENDATIONS

Recommendation #1:

The General Assembly may wish to require each agency and higher education institution that has at least one building to perform a comprehensive review and determine the dollar amount of its deferred maintenance backlog. To implement this requirement, the affected agencies may require additional resources. Once this has been determined, the General Assembly will be in a better position to decide, on a statewide basis, where to apply the available funding to obtain the greatest benefit to the Commonwealth.

Recommendation #2:

The General Assembly may wish to adopt a routine, quantifiable method for assessing the condition of the facilities in the Commonwealth. The General Assembly should consider adapting the SCHEV facility condition assessment process for all state agencies and institutions. In doing this, the General Assembly, or its designee, should provide specific, uniform guidance on how and when to perform inspections and how to estimate the value of the buildings and the cost of the deficiencies. This process would be a good starting point to enable the Commonwealth to determine the condition of all of its buildings and decide, on a statewide basis, where to make the investments to bring these assets back to their original state. The General Assembly should include, in this process, requirements for the individuals performing the inspections, determining the deficiencies, and calculating the building and deficiency values. This may require additional resources.

Recommendation #3:

The General Assembly and the Department of Planning and Budget should consider instituting a full life cycle analysis for each new capital project. The life cycle cost analysis includes annual operations and maintenance needs, projected maintenance reserve requirements by fiscal year, and a projected effective life for the asset. Planning and Budget should require the life cycle cost be submitted as part of the initial funding request. The Department of General Services should include the Planning and Budget requirement in the Construction and Professional Service Manual. This approach would provide the Commonwealth with the anticipated full cost of ownership from the outset. When the General Assembly commits to a new capital project under the full life cycle analysis process, it will commit to providing the maintenance funding for the life of the facility.

Recommendation #4:

The Department of Planning and Budget should require agencies and institutions to include preventive maintenance budgets in their operating budget proposals each year/biennium for each facility they own. The General Assembly should request and track deferred maintenance amounts as part of the budget process.

Recommendation #5:

The General Assembly may wish to create the capacity within the Department of General Services for the Department to develop routine building preventive maintenance schedules for distribution to agencies. These schedules should include all routine items necessary to maintain the buildings in an acceptable state. In developing these schedules, General Services should look for national and industry standards to support the schedules.